Morse Micro
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Federal Communications Commission
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Subject: WT Docket No. 24-240; RM-11989

Morse Micro is a fabless semiconductor company headquartered in Sydney (Australia). The main focus of the company is to commercialize Wi-Fi chipset based on the IEEE 802.11ah standard, also known as Wi-Fi HaLow.

Wi-Fi HaLow was conceived by the IEEE to address deficiencies of current IoT technologies and to power the next generation of IoT devices. The standard relies entirely on the ISM band to provide free, secure, long range, low power connectivity and support the future of IoT.

Morse Micro is strongly opposed to the NextNav petition to the FCC (Lantz). And the following are some comments in response to the Public Notice (FCC #3).

Comment 1,

The petition states, "The Lower 900 MHz Band Is Underutilized Due to Outdated Service and Technical Rules" (Lantz pg 17).

The ISM band is a critical resource for a vast array of IoT technologies and devices, which will drive the future of smart ecosystems, including smart cities and smart manufacturing. As of 2024, millions of devices operate in the ISM band globally (Swedberg), overall there are millions of Part 15 devices operating in the 900 MHz band (FCC #3, pg 4).

- Wi-Fi HaLow - Based on the IEEE 802.11ah standard, Wi-Fi HaLow offers long-range, low-power connectivity for IoT devices. Morse Micro alone anticipates deploying millions of Wi-Fi HaLow chips annually, with expectations to capture a significant share of the wireless IoT market. The key benefits of Wi-Fi HaLow include:
    - Long range: up to 1 kilometer
    - Robust connection in challenging environments: penetration through walls
    - Significant battery power savings: supports devices that operate using coin-sized batteries for years
    - Streamlined access to internet and cloud-based applications: no need for proprietary hubs or gateways
    - Latest Wi-Fi security protections: support for the latest and most advanced Wi-Fi security – WPA3
- LoRa - Semtech, the primary implementer of LoRa technology, reports that over 270 million LoRa end nodes have been deployed as of 2022. This number is expected to grow significantly, with projections estimating around 416 million annual shipments by 2028.

- Wi-SUN - Used primarily in smart utility and smart city applications, Wi-SUN technology is poised for substantial growth, with a TAM of approximately 216 million units in 2024, expected to grow to 384 million units by 2028.
- Zigbee/Thread - Operating in both 2.4 GHz and sub-GHz bands, Zigbee and Thread continue to see widespread adoption in smart homes and industrial automation. The combined TAM for these technologies is projected to grow from 0.8 billion units in 2024 to 1.3 billion units by 2028.
- RFID

As the IoT ecosystem expands, the reliance on the ISM band will only increase. By 2028, the total addressable market for wireless IoT chips across these technologies is expected to reach over 14 billion units annually. This growth is driven by the increasing adoption of smart city infrastructure, industrial automation, and consumer IoT devices, all of which rely heavily on the ISM band for communication. The growth trajectory of these technologies underscores the importance of preserving access to unlicensed spectrum.

Comment 2,

The petition states, “Users of Part 15 devices do not have any allocation status in the Commission’s rules. Instead, the Commission makes spectrum available for Part 15 devices on an unprotected and non-interference basis. Under Part 15, unlicensed devices may not cause harmful interference to LMS licensees, amateur operations, or other licensed systems in the Lower 900 MHz Band. See id. § 90.361. (Lantz pg 18)”

The assertion that Part 15 devices do not have any allocation status is incorrect. Please see § 2.106 (FCC #1).

Comment 3,

The petition attempts to display and describe prioritization in the Lower 900 MHz band on pages 17 and 18 with text and Figure 4. In particular, the petition states, “Unlicensed devices have the lowest priority and cannot claim interference rights, except for unacceptable interference from M-LMS licensees in some cases, and may not cause harmful interference to M-LMS and non-M-LMS licensees, amateur operations, or other licensed systems.” (Lantz pg 18).

The prioritization described is incorrect. § 90.353 LMS operation in the 902-928 MHz band (a) states, “LMS operations will not cause interference to and must tolerate interference from industrial, scientific, and medical (ISM) devices and radiolocation Government stations that operate in the 902-928 MHz band.” (FCC #2). § 90.353 LMS operation in the 902-928 MHz band (d) also states “Additionally, EA multilateration LMS licenses will be conditioned upon the licensee's ability to demonstrate through actual field tests that their systems do not cause unacceptable levels of interference to 47 CFR part 15 devices.”

Hence LMS priority is below Unlicensed FCC Part 15 priority.

Comment 4,

IEEE 802.11ah selected the 900 MHz band over 2.4 GHz, 3.65 GHz and 5 GHz for its better range per transmit power (Halasz). This provides for increased battery life for IoT devices. The unlicensed 900 MHz band is extremely important for supporting the increasing range requirements of Smart Cities (Locke).

Comment 5,

Based on previous comments, NextNav should seek a solution that does not cause interference to Part 15 devices in the 900 MHz band and should avoid causing havoc to millions of devices. And the testing requirement to not cause unacceptable levels of interference to part 15 devices (FCC #2) should remain.

NextNav’s proposal, in its current form, would be catastrophic for the IoT ecosystem and the companies powering it, including Morse Micro.

Sincerely,

David Halasz
Director of Standards
Morse Micro

Works Cited

1) FCC. *§ 2.106 Table of Frequency Allocations.* pg 31, https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-2/subpart-B/section-2.106.
2) FCC. *§ 90.353 LMS operations in the 902-928 MHz band.* https://www.ecfr.gov/current/title-47/chapter-I/subchapter-D/part-90/subpart-M/section-90.353.
3) FCC. "Wireless Telecommunications Bureau and Office of Engineering and Technology Seek Comment on NextNav Petition for Rulemaking." https://www.fcc.gov/document/wtb-and-oet-seek-comment-nextnav-petition-rulemaking.
4) Halasz, David. *900 MHz ISM Band*. 2010, https://mentor.ieee.org/802.11/dcn/09/11-09-1313-05-0wng-900-mhz-ism-band.ppt.
5) Lantz, Robert. "PETITION FOR RULEMAKING OF NEXTNAV INC., Enabling Next-Generation Terrestrial Positioning, Navigation, and Timing and 5G: A Plan for the Lower 900 MHz Band, at I (902-928 MHz)." April 16, 2024, https://www.fcc.gov/ecfs/document/10416238018537/1.
6) Locke, Jayna. "IoT Applications in Smart Cities." *Digi International*, 14 December 2018, https://www.digi.com/blog/post/2018/iot-applications-in-smart-cities. Accessed 29 August 2024.
7) Swedberg, Claire. "Trials Find Wi-Fi HaLow Offers High Performance IoT Connectivity." *RFID Journal*, August 7, 2024, https://www.rfidjournal.com/news/trials-find-wi-fi-halow-offers-high-performance-iot-connectivity/221399/.
8) Wi-Fi Alliance. "Wi-Fi CERTIFIED HaLow Highlights." *https://www.wi-fi.org/system/files/Wi-Fi_CERTIFIED_HaLow_Highlights.pdf*.